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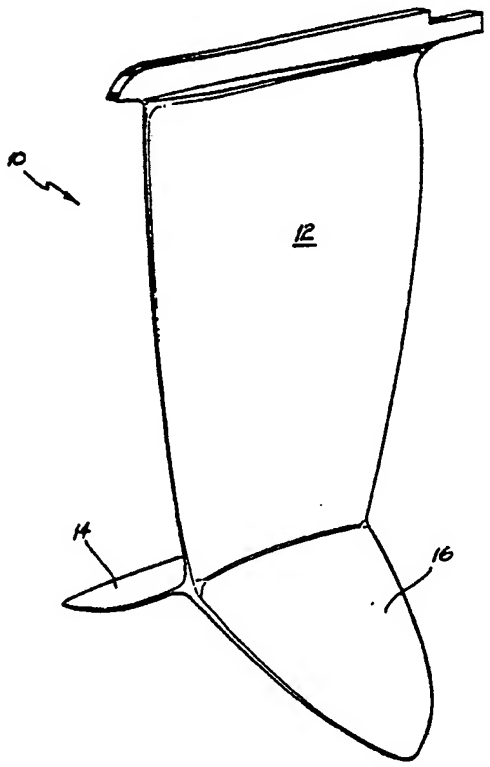
(54) Title: SURFBOARD AND FIN

(57) Abstract

A hydrodynamically efficient fin (10) for a surfboard, surf ski of the like comprises a fin body (12) and a pair of wing members (14, 16) extending laterally outwardly on opposite sides of the fin body (12) at the bottom thereof. The fin body (12) has an aeroplane wing profile and aerofoil cross-section. An improved surfboard comprises a winged fin as described above together with rounded rails for increased stability and manoeuvrability.



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SURFBOARD AND FIN

The present invention is directed to a hydrodynamically efficient fin for surfboards, surf skis or the like, and a surfboard having such a fin.

BACKGROUND ART

The design of a surfboard governs its performance and various modifications to surfboards and their fins have been made since their introduction in an effort to obtain optimum performance. For example, the length of the board has been shortened and multiple fins have been used in recent years. It has been found however, that while the use of multiple fins facilitates the riding of the board due to increased stability, the board's response is "jerky" and it is difficult to obtain smooth turns and maneouvres.

Fin design is a crucial factor in surfboard performance. Since the fin performs an important role in turns, the fin design can have a marked effect on the maneouvrability of the surfboard.

In the past, fin design has been largely empirical, i.e. on a "trial-and-error" basis, rather than scientific. The present invention provides a hydrodynamically efficient fin designed on a scientific basis using the aerodynamic characteristics of an aeroplane wing, namely the "Spitfire" aeroplane wing, and the stability characteristics of a winglet system. It is known, for example from Australian Patent Application No 31663/71, to add winglets to a surfboard fin. Such winglets are added to stabilize the surfboard. Since the winglets of the prior art surfboard are merely added to a conventional fin without any overall integrated design, the resultant fin is less efficient hydrodynamically, and speed was sacrificed for stability. In the present invention however, the winglets are formed integrally with the fin and have a side profile which is an extension of the fin profile.

An improved board is also provided, the board being designed to exploit the speed advantages of the fin.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided an improved fin for use on aquatic craft such as surfboards, surf skis or the like, characterised in that said

fin has a main portion with an aeroplane wing profile, i.e. a substantially straight leading edge and a trailing edge curved towards the leading edge, an aerofoil cross-section, and a pair of wing members, said wing members extending laterally outwardly from the main portion of the fin on opposite sides at the bottom thereof, wherein the leading and trailing edges of the wing members are extensions of the leading and trailing edges, respectively, of the main portion.

The term "laterally outwardly" is not limited to wing members which are perpendicular to the fin body, but includes a wing member having a component in a direction perpendicular to the plane of the main portion. In the preferred embodiment, the wing members extend outwardly and downwardly from the fin so that the fin and two wing members are equally spaced circumferentially.

Due to the aeroplane wing profile and the winglet design, cavitation is greatly reduced. (Cavitation is the formation of vacuums by a body travelling through a fluid). Reduction of cavitation results in a corresponding reduction in "drag" which translates into increased forward driving power. As a result, the surfboard rider can achieve greater speeds with the fin of the present invention.

The winglet design also increases maneouvrability since a smaller turning circle is required. Further, the wings serve to "hold" the board to the wave resulting in greater stability and control over the board.

It is known that the draught of a normal fin decreases on turns as the surfboard is tilted. However, due to the winglet design of the fin of the present invention, a greater draught is obtained on the turns, resulting in greater control over the surfboard and higher acceleration through the turn.

The fin of the present invention can be made by any suitable known technique, such as fibreglass moulding. Preferably however, the fin is made from injection moulded plastic.

According to another aspect of the present invention there is disclosed an improved surfboard, said surfboard having a fin as described above, rounded rails and a rounded nose. The term "rails" refers to the bottom side edges of the

surfboard. Such a surfboard presents less resistance to water flow thereby allowing greater acceleration through turns and higher speeds on waves.

BRIEF DESCRIPTION OF DRAWINGS

Notwithstanding any other forms of the invention, preferred embodiments thereof will now be described with reference to the drawings in which:

Fig. 1 is a front elevation of the fin of a preferred embodiment,

Fig. 2 is a cross sectional view along A-A of Fig. 1,

Fig. 3 is a cross sectional view along B-B of Fig. 1,

Fig. 4 is a perspective view of the winged fin of Fig. 1,

Fig. 5 is a side elevational view of the winged fin of Fig. 1 showing its profile,

Fig. 6 is a plan view of a surfboard according to another embodiment of the present invention.

Fig. 7 is a side view of the surfboard of Fig. 6,

Fig. 8 is an end view of the surfboard of Fig. 6,

Fig. 9 is a part cross-sectional view of a rail of a prior art surfboard,

Fig. 10 is a plan view of the nose of a prior art surfboard,

Fig. 11 is a part cross-sectional view of a rail of the surfboard of Fig. 6, and

Fig. 12 is a plan view of the nose of the surfboard of Fig. 6.

DESCRIPTION OF PREFERRED EMBODIMENTS

As shown in Figs 1 to 5, the fin 10 of the preferred embodiment comprises a main fin portion 12 having winglets, i.e. a pair of wing members 14, 16 at its lower end. The wing members 14, 16 extend downwardly and outwardly from the fin body 12. In the illustrated embodiment, the wing members 14, 16 are orientated at an angle of 120° to the fin body 12, and to each other.

The cross sectional shape of the fin 10 (see Figs. 2 & 3) is of aerofoil shape for optimum performance through the water. Furthermore, the side profile of the fin, shown in Fig. 5, is of aeroplane wing shape, e.g. similar to that of the Spitfire aeroplane. It has a substantially straight

leading edge perpendicular to the direction of motion and a trailing edge which curves forward towards the leading edge. The wing members are designed integrally with the fin body, i.e. the leading and trailing edges of the wing members are extensions of the leading and trailing edges, respectively, of the main fin body. The use of wing members, and the integrated design, leads to a reduction in cavitation and drag and a corresponding increase in the speeds which can be achieved. It is well known to those skilled in the art that in order to win surfboard riding championships, it is necessary to execute intricate maneouvres and that such maneouvres can be achieved more readily with a "fast" surfboard, i.e. one which is capable of higher speeds and acceleration. Whereas the prior art fins using stabilizer wing members sacrificed speed for greater control, the fin of the present invention is designed to achieve higher speeds yet with a sufficient degree of control. For this reason, the main fin body has the profile of an aeroplane wing to minimize drag, and the wing members are added for stability but designed integrally with the main fin body so as not to hamper its performance.

Typically, the fin is made of plastics material according to known techniques, e.g. injection moulding.

The surfboard 20 of a further embodiment is shown in Fig. 6. It tapers from a wide tail 22 to a rounded nose 24, as shown also in Fig. 12. It is to be noted that unlike the pointed nose of prior art surfboards (see Fig. 10) the nose of the surfboard of the preferred embodiment is rounded and tends to prevent the board from "digging" into the wave.

The rails 26 of the illustrated surfboard are thickened and rounded (Fig. 11), in comparison to the square edge rails of the prior art surfboards (Fig. 9). The rounded rail presents less water resistance and allows the board to "roll" into the wave during turns, rather than digging into the water. This enables the board to take advantage of the higher speeds which can be attained with the fin described above.

The foregoing describes only some embodiments of the present invention, and modifications which are obvious to

those skilled in the art may be made thereto without departing from the scope of the invention. For example, the angle of the wing members on the fin can be varied. The fin is also suitable for other craft such as sailboards, surf or wave skis, and the like.

CLAIMS

1. An improved fin for use on aquatic craft such as surfboards, surf skis or the like, characterised in that a main portion of the fin has an aeroplane wing profile with a substantially straight leading edge and a trailing edge curved towards the leading edge, an aerofoil cross-section, and a pair of wing members, said wing members extending laterally outwardly from the main portion of the fin on opposite sides at the bottom thereof, wherein the leading and trailing edges of the wing members are extensions of the leading and trailing edges, respectively, of the main portion.

2. A fin as claimed in claim 1, wherein the wing members and main portion of the fin are equally spaced circumferentially.

3. A fin as claimed in claim 1, said fin being made of plastics material by injection moulding.

4. A fin as claimed in claim 1, wherein in use, the leading edge of the main portion of the fin is orientated substantially perpendicular to the direction of motion.

5. A surfboard having a fin as claimed in claim 1.

6. A surfboard as claimed in claim 5, further comprising rounded rails and a rounded nose portion.

7. A surboard as claimed in claim 6, wherein the width of the surfboard tapers from tail to nose of the surboard.

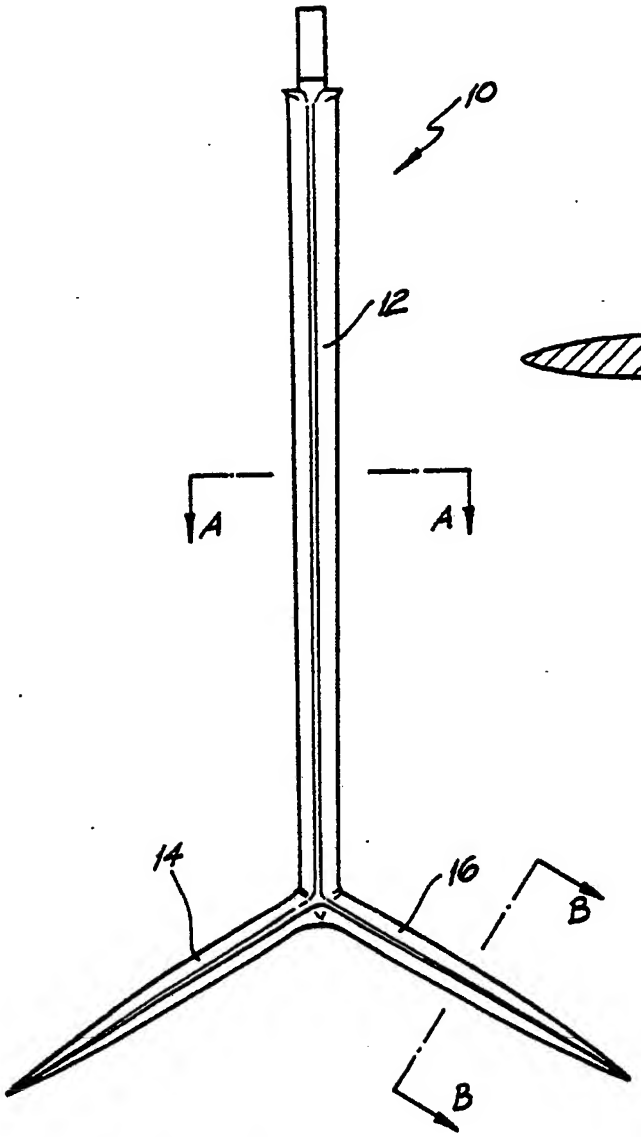

FIG. 1

FIG. 2

FIG. 3

ORIGINAL
4 SHEETS SHEET 2

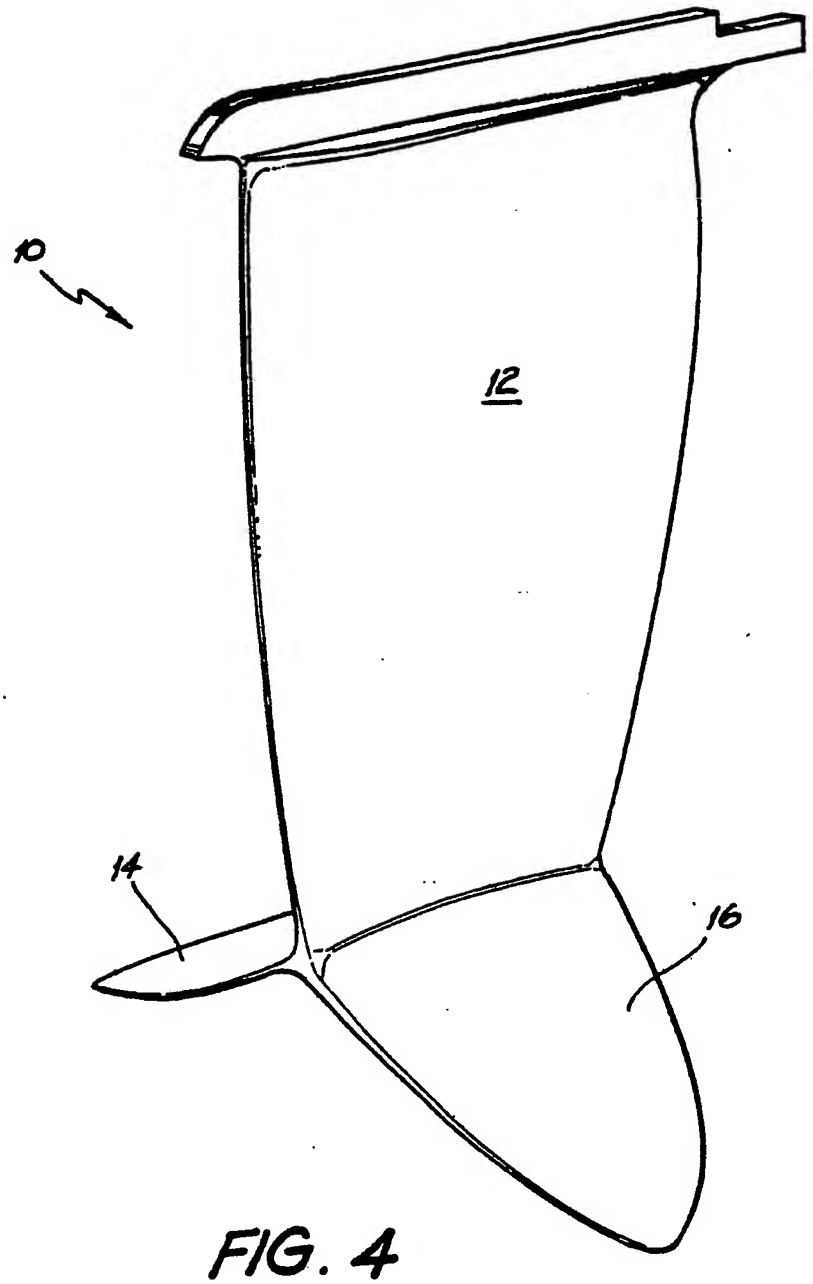

FIG. 4

ORIGINAL
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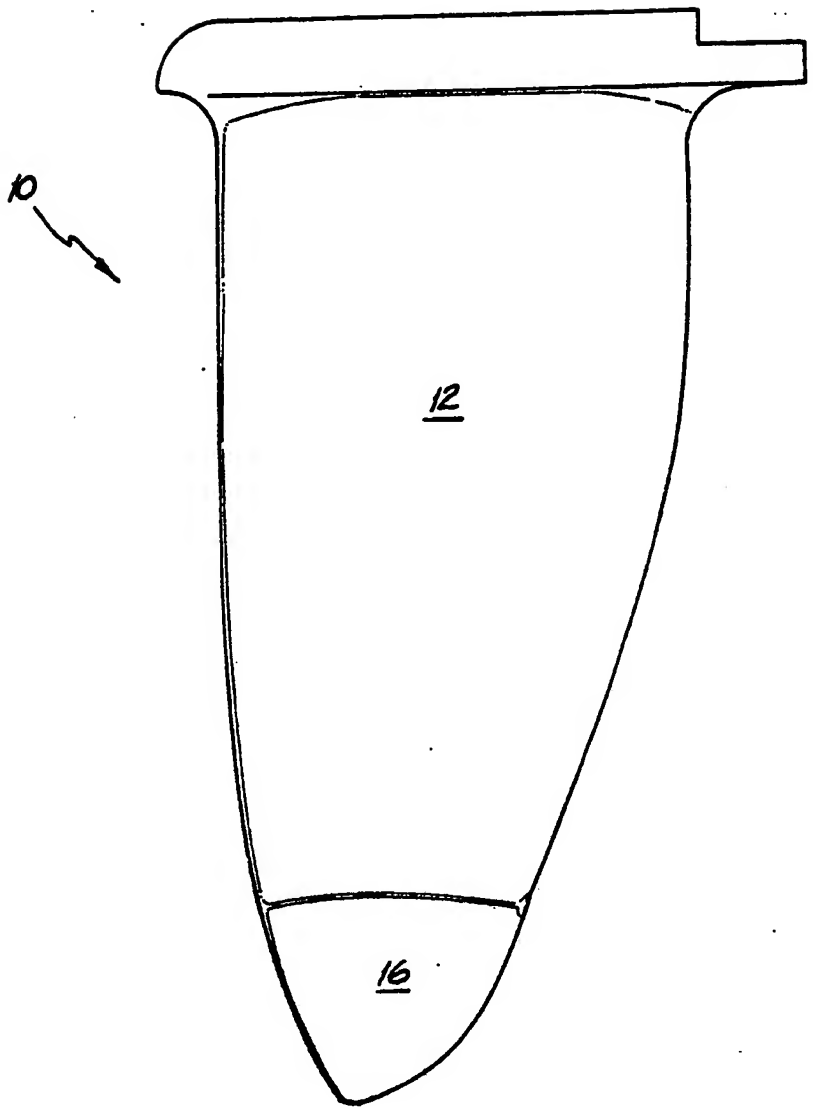

FIG. 5

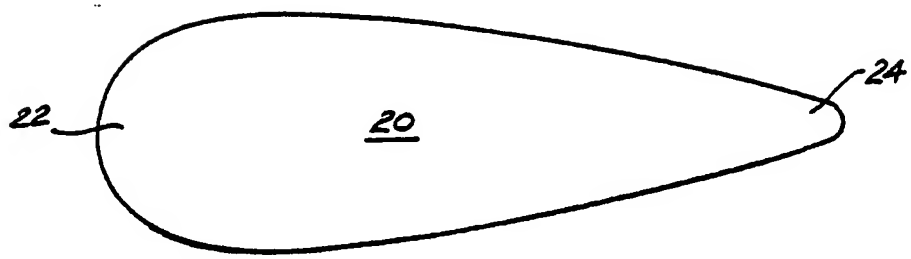

FIG. 6

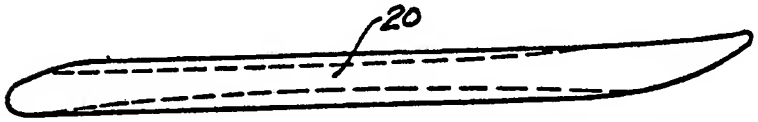

FIG. 7

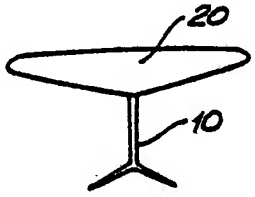

FIG. 8

FIG. 9

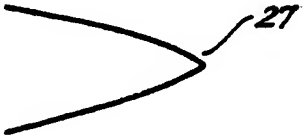

FIG. 10

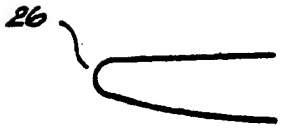

FIG. 11

FIG. 12

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 85/00012

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[4] A63C 15/05, B63B 3/38

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC	A63C 15/00, 15/05, B63B 3/38

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

AU: IPC as above; Australian Classification 91.6

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	AU, B, 65360/74 (485984) (DYNAFOIL, INC.) 14 August 1975 (14.08.75)	(1)
A	AU, B, 31663/71 (RICHARDS DESIGNS PTY LTD) 1 February 1973 (01.02.73)	
A	AU, B, 21982/67 (429134) (STEINBERG) 21 November 1968 (21.11.68)	
Y	AU, B, 2289/36 (103245) (J.S. WHITE & COMPANY LIMITED) 14 June 1936 (14.06.36)	(1)
Y	US, A, 3121890 (RUMSEY) 25 February 1964 (25.02.64)	(1)
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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
15 April 1985 (15.04.85)	(18.04.85) 18 APRIL 1985
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Australia n Patent Office	(O. HAGGAR)

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